

Table 1 -- Alternative Treatment Standards for Hazardous Debris¹

<i>Technology description</i>	<i>Performance and/or design and operating standard</i>	<i>Contaminant restrictions²</i>
<p>A. Extraction Technologies</p> <p>1. Physical Extraction</p> <p>a. <i>Abrasive Blasting</i>: Removal of contaminated debris surface layers using water and/or air pressure to propel a solid media (e.g., steel shot, aluminum oxide grit, plastic beads).</p> <p>b. <i>Scarification, Grinding, and Planing</i>: Process utilizing striking piston heads, saws, or rotating grinding wheels such that contaminated debris surface layers are removed.</p> <p>c. <i>Spalling</i>: Drilling or chipping holes at appropriate locations and depth in the contaminated debris surface and applying a tool which exerts a force on the sides of those holes such that the surface layer is removed. The surface layer removed remains hazardous debris subject to the debris treatment standards.</p> <p>d. <i>Vibratory Finishing</i>: Process utilizing scrubbing media, flushing fluid, and oscillating energy such that hazardous contaminants or contaminated debris surface layers are removed.⁴</p> <p>e. <i>High Pressure Steam and Water Sprays</i>: Application of water or steam sprays of sufficient temperature, pressure, residence time, agitation, surfactants, and detergents to remove hazardous contaminants from debris surfaces or to remove contaminated debris surface layers.</p> <p>2. Chemical Extraction</p> <p>a. <i>Water Washing and Spraying</i>: Application of water sprays or water baths of sufficient temperature, pressure, residence time, agitation, surfactants, acids, bases, and detergents to remove hazardous contaminants from debris surfaces and surface pores or to remove contaminated debris surface layers.</p>	<p><i>Glass, Metal Plastic, Rubber</i>: Treatment to a clean debris surface.³</p> <p><i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Removal of at least 0.6 cm of the surface layer; treatment to a clean debris surface.³</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p><i>All Debris</i>: Treatment to a clean debris surface;³</p> <p><i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Debris shall be no more than 1.2 cm (1/2 inch) in one dimension (i.e., thickness limit,⁵ except that this thickness limit may be waived under an "Equivalent Technology" approval under section 66268.42(b);⁸ debris surfaces shall be in contact with water solution for at least 15 minutes.</p>	<p><i>All Debris</i>: None.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p>Same as above.</p> <p><i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Contaminant shall be soluble to at least 5% by weight in water solution or 5% by weight in emulsion; if debris is contaminated with a dioxin-listed waste,⁶ and "Equivalent Technology" approval under section 66268.42(b) shall be obtained.⁸</p>
<p>Technology description</p> <p>b. <i>Liquid Phase Solvent Extraction</i>: Removal of hazardous contaminants from debris surfaces and surface pores by applying a nonaqueous liquid or liquid solution which causes the hazardous contaminants to enter the liquid phase and be flushed away from the debris along with the liquid or liquid solution while using appropriate agitation, temperature, and residence time.⁴</p>	<p>Performance and/or design and operating standard</p> <p>Same as above.</p>	<p>Contaminant restrictions²</p> <p><i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Same as above, except that contaminant shall be soluble to at least 5% by weight in the solvent.</p>

<p>c. <i>Vapor Phase Solvent Extraction</i>: Application of an organic vapor using sufficient agitation, residence time, and temperature to cause hazardous contaminants on contaminated debris surfaces and surface pores to enter the vapor phase and be flushed away with the organic vapor.⁴</p>	<p>Same as above, except that brick, cloth, concrete, paper, pavement, rock and wood surfaces shall be in contact with the organic vapor for at least 60 minutes.</p>	<p>Same as above.</p>
<p>3. Thermal Extraction a. <i>High Temperature Metals Recovery</i>: Application of sufficient heat, residence time, mixing, fluxing agents, and/or carbon in a smelting, melting, or refining furnace to separate metals from debris.</p>	<p>For refining furnaces, treated debris shall be separated from treatment residuals using simple physical or mechanical means,⁹ and, prior to further treatment, such residuals shall meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.</p>	<p><i>Debris contaminated with a dioxin-listed waste</i>.⁵ Obtain an "Equivalent Technology" approval under section 66268.42(b).⁸</p>
<p>b. <i>Thermal Desorption</i>: Heating in an enclosed chamber under either oxidizing or nonoxidizing atmospheres at sufficient temperature and residence time to vaporize hazardous contaminants from contaminated surfaces and the surface pores and to remove the contaminants from the heating chamber in a gaseous exhaust gas.⁷</p>	<p><i>All Debris</i>: Obtain an "Equivalent Technology" approval under section 66268.42(b);⁸ treated debris shall be separated from treatment residuals using simple physical or mechanical means,⁹ and, prior to further treatment, such residues shall meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris. <i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Debris shall be no more than 10 cm (4 inches) in one dimension (i.e., thickness limit),⁵ except that this thickness limit may be waived under the "Equivalent Technology" approval.</p>	<p><i>All Debris</i>: Metals other than mercury.</p>
<p>Technology description</p>	<p>Performance and/or design and operating standard</p>	<p>Contaminant restrictions²</p>
<p>B. Destruction Technologies 1. <i>Biological Destruction (Biodegradation)</i>: Removal of hazardous contaminants from debris surfaces and surface pores in an aqueous solution and biodegradation of organic or nonmetallic inorganic compounds (i.e., inorganics that contain phosphorus, nitrogen, or sulfur) in units operated under either aerobic or anaerobic conditions.</p>	<p><i>All Debris</i>: Obtain an "Equivalent Technology" approval under section 66268.42(b);⁸ treated debris shall be separated from treatment residuals using simple physical or mechanical means,⁹ and, prior to further treatment, such residues shall meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris. <i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood</i>: Debris shall be no more than 1.2 cm (1/2 inch) in one dimension (i.e., thickness limit),⁵ except that this thickness limit may be waived under the "Equivalent Technology" approval.</p>	<p><i>All Debris</i>: Metal contaminants.</p>
<p>2. Chemical Destruction a. <i>Chemical Oxidation</i>: Chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combination of reagents—(1) hypochlorite (e.g., bleach); (2) chlorine; (3) Chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent destruction efficiency.⁴ Chemical oxidation specifically includes</p>	<p><i>All Debris</i>: Obtain an "Equivalent Technology" approval under section 66268.42(b);⁸ treated debris shall be separated from treatment residuals using simple physical or mechanical means,⁹ and, prior to further treatment, such residues shall meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.</p>	<p><i>All Debris</i>: Metal contaminants.</p>

what is referred to as alkaline chlorination.	<i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:</i> Debris shall be no more than 1.2 cm (1/2 inch) in one dimension (i.e., thickness limit), ⁵ except that this thickness limit may be waived under the "Equivalent Technology" approval.	
b. Chemical Reduction: Chemical reaction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (1) sulfur dioxide; (2) sodium, potassium, or alkali salts of sulfites, bisulfites, and metabisulfites, and polyethylene glycols (e.g., NaPEG and KPEG); (3) sodium hydrosulfide; (4) ferrous salts; and/or (5) other reducing reagents of equivalent efficiency. ⁴	Same as above.	Same as above.
Technology description	Performance and/or design and operating standard	Contaminant restrictions ²
3. <i>Thermal Destruction:</i> Treatment in an incinerator operating in accordance with CCR, Title 22, Chapter 14, article 15, or Chapter 15, article 15, of this division; a boiler or industrial furnace operating in accordance with 40 CFR Part 266, Subpart H, or other thermal treatment unit operated in accordance with 40 CFR Part 264, Subpart X or 40 CFR Part 265, Subpart P, but excluding for purposes of these debris treatment standards Thermal Desorption units.	Treated debris shall be separated from treatment residuals using simple physical or mechanical means, ⁹ and, prior to further treatment, such residue shall meet the waste-specific treatment standard for organic compounds in the waste contaminating the debris.	<i>Brick, Concrete, Glass, Metal, Pavement, Rock, Metal:</i> Metals other than mercury, except that there are no metal restrictions for vitrification. <i>Debris contaminated with a dioxin-listed waste:</i> ⁶ Obtain an "Equivalent Technology" approval under section 66268.42(b), ⁸ except that this requirement does not apply to vitrification.
C. Immobilization Technologies		
1. <i>Macroencapsulation:</i> Application of surface coating materials such as polymeric organics (e.g., resins and plastics) or use of a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media.	Encapsulating material shall completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).	None.
2. <i>Microencapsulation:</i> Stabilization of the debris with the following reagents (or waste reagents) such that the leachability of the hazardous contaminants is reduced: (1) Portland cement; or (2) lime/pozzolans (e.g., fly ash and cement kiln dust). Reagents (e.g., iron salts, silicates, and clays) may be added to enhance the set/cure time and/or compressive strength, or to reduce the leachability of the hazardous constituents. ⁵	Leachability of the hazardous contaminants shall be reduced.	None.
3. <i>Sealing:</i> Application of an appropriate material which adheres tightly to the debris surface to avoid exposure of the surface to potential leaching media. When necessary to effectively seal the surface, sealing entails pretreatment of the debris surface to remove foreign matter and to clean and roughen the surface. Sealing materials include epoxy, silicone, and urethane compounds, but paint may not be used as a sealant.	Sealing shall avoid exposure of the debris surface to potential leaching media and sealant shall be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).	None.

¹ Hazardous debris shall be treated by either these standards or the waste-specific treatment standards for the waste contaminating the debris. The treatment standards shall be met for each type of debris contained in a

mixture of debris types, unless the debris is converted into treatment residue as a result of the treatment process. Debris treatment residuals are subject to the waste-specific treatment standards for the waste contaminating the debris.

² Contaminant restriction means that the technology is not BDAT for that contaminant. If debris containing a restricted contaminant is treated by the technology, the contaminant shall be subsequently treated by a technology for which it is not restricted in order to be land disposed (and excluded from the requirements of this division).

³ "Clean debris surface" means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

⁴ Acids, solvents, and chemical reagents may react with some debris and contaminants to form hazardous compounds. For example, acid washing of cyanide-contaminated debris could result in the formation of hydrogen cyanide. Some acids may also react violently with some debris and contaminants, depending on the concentration of the acid and the type of debris and contaminants. Debris treaters should refer to the safety precautions specified in Material Safety Data Sheets for various acids to avoid applying an incompatible acid to a particular debris/contaminant combination. For example, concentrated sulfuric acid may react violently with certain organic compounds, such as acrylonitrile.

⁵ If reducing the particle size of debris to meet the treatment standards results in material that no longer meets the 60 mm minimum particle size limit for debris, such material is subject to the waste-specific treatment standards for the waste contaminating the material, unless the debris has been cleaned and separated from contaminated soil and waste prior to size reduction. At a minimum, simple physical or mechanical means shall be used to provide such cleaning and separation of nondebris materials to ensure that the debris surface is free of caked soil, waste or other nondebris material.

⁶ Dioxin-listed wastes are EPA Hazardous Waste numbers F020, F021, F022, F023, F026, and F027.

⁷ Thermal desorption is distinguished from Thermal Destruction in that the primary purpose of Thermal Desorption is to volatilize contaminants and to remove them from the treatment chamber for subsequent destruction or other treatment.

⁸ The demonstration "Equivalent Technology" under section 66268.42(b) shall document that the technology treats contaminants subject to treatment to a level equivalent to that required by the performance and design and operating standards for other technologies in this table such that residual levels of hazardous contaminants will not pose a hazard to human health and the environment absent management controls.

⁹ Any soil, waste, and other nondebris material that remains on the debris surface (or remains mixed with the debris) after treatment is considered a treatment residual that shall be separated from the debris using, at a minimum, simple physical or mechanical means. Examples of simple physical or mechanical means are vibratory or trommel screening or water washing. The debris surface need not be cleaned to a "clean debris surface" as defined in note 3 when separating treated debris from residue; rather, the surface shall be free of caked soil, waste, or other nondebris material. Treatment residuals are subject to the waste-specific treatment standards for the waste contaminating the debris.

NOTE: Authority cited: Sections 25150, 25159, 25159.5, 25179.6 and 58012, Health and Safety Code. Reference: Sections 25159, 25159.5 and 58012, Health and Safety Code; 40 CFR Section 268.45.

HISTORY

1. New section and Table 1 filed 10-24-94 as an emergency; operative 10-24-94 (Register 94, No. 43). A Certificate of Compliance must be transmitted to OAL by 2-20-95 or emergency language will be repealed by operation of law on the following day.
2. New section and Table 1 refiled 2-21-95 as an emergency; operative 2-21-95 (Register 95, No. 8). A Certificate of Compliance must be transmitted to OAL by 6-21-95 or emergency language will be repealed by operation of law on the following day.
3. New section and Table 1 refiled 6-19-95 as an emergency; operative 6-19-95 (Register 95, No. 25). A Certificate of Compliance must be transmitted to OAL by 10-17-95 or emergency language will be repealed by operation of law on the following day.
4. New section and Table 1 refiled 10-16-95 as an emergency; operative 10-16-95 (Register 95, No. 42). A Certificate of Compliance must be transmitted to OAL by 2-13-96 or emergency language will be repealed by operation of law on the following day.
5. Certificate of Compliance as to 10-24-94 order including amendment of subsections (a)-(b)(1), (b)(3), (c), (d)(1), (d)(1)(A) and (d)(2)-(3) and amendment of Table 1 transmitted to OAL 12-15-95 and filed 1-31-96 (Register 96, No. 5).
6. Change without regulatory effect amending subsections (a), (c), (d)(1)(B) and (d)(2) and footnote 8 of Table 1 filed 8-15-97 pursuant to section 100, title 1, California Code of Regulations (Register 97, No. 33).
7. Change without regulatory effect amending subsections (a), (b)(1), (d)(3) and (d)(4) filed 6-4-99 pursuant to section 100, title 1, California Code of Regulations (Register 99, No. 23).
8. Change without regulatory effect amending subsection (c)(4) filed 6—7—2004 pursuant to section 100, title 100, California Code of Regulations (Register 2004, No. 24).